

Parametric Amplifiers for Detector Arrays

Completed Technology Project (2015 - 2016)



Project Introduction

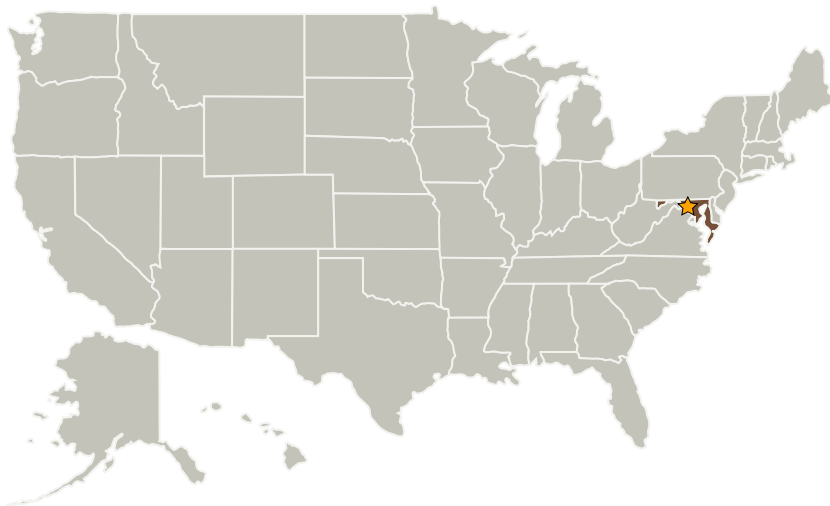
This project aims to make microwave parametric amplifiers with improved gain, bandwidth, sensitivity, and power dissipation. The amplifiers would enable revolutionary astrophysics instruments with sensitive far-infrared detectors or high-resolution x-ray microcalorimeters.

Our goal is to build high gain microwave amplifiers with improved sensitivity, increased bandwidth, and less power dissipation when operated at cryogenic temperatures. Such amplifiers would improve instrument performance in future astrophysics missions. Applications include readout of far infrared detectors based on Microwave Kinetic Inductance Detectors (MKIDs), or in x-ray microcalorimeters with multiplexed microwave SQUID amplifier (mSQUID) readout systems.

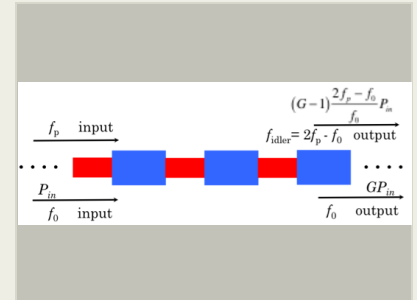
Anticipated Benefits

Applicable in ground-based demonstration instruments for astrophysics. Provide lower amplifier noise temperature and lower power dissipation than state-of-the art High Electron Mobility Transistors over a wide bandwidth.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Goddard Space Flight Center (GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland



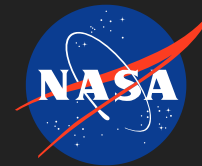
In the type of parametric amplifier being developed in this project, a small microwave signal and a large amplitude pump wave are input. The amplifier outputs are an amplified signal at the original signal frequency, as well as an...

Table of Contents

Project Introduction	1
Anticipated Benefits	1
Primary U.S. Work Locations and Key Partners	1
Images	2
Links	2
Project Website:	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	3
Technology Areas	3

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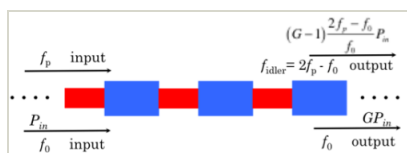
Completed Technology Project (2015 - 2016)



Primary U.S. Work Locations

Maryland

Images

**Broadband parametric amplifier**

In the type of parametric amplifier being developed in this project, a small microwave signal and a large amplitude pump wave are input. The amplifier outputs are an amplified signal at the original signal frequency, as well as an idler tone.

(<https://techport.nasa.gov/image/18987>)

Links

GSC-17504-1
(no url provided)

Project Website:

<http://aetd.gsfc.nasa.gov/>

Organizational Responsibility**Responsible Mission Directorate:**

Mission Support Directorate (MSD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Center Independent Research & Development: GSFC IRAD

Project Management**Program Manager:**

Peter M Hughes

Project Managers:

Stanley D Hunter
Terence A Doiron

Principal Investigator:

Thomas R Stevenson

Co-Investigators:

Megan E Eckart
Edward J Wollack
Ari D Brown
Negar Ehsan

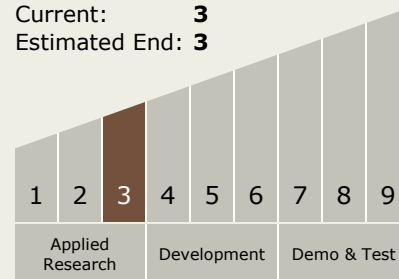
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Technology Maturity (TRL)

Start: **3**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.1 Remote Sensing Instruments/Sensors
 - └ TX08.1.1 Detectors and Focal Planes